Amendment to the Claims:

This listing of the claims will replace all prior versions and listings of the claims in this application.

Listing of Claims:

1. (previously presented) A thermally-activated exhaust treatment device adapted to control exhaust emissions in a vehicle, comprising:

an inner housing having a first inlet and a first outlet defining a longitudinal direction and having an exhaust treatment device therein chosen to reduce emissions from exhaust of a combustion engine as the exhaust passes from the first inlet to the first outlet;

an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including a second inlet and a second outlet that align with the first inlet and the first outlet of the inner housing, the inner and outer housings including walls forming a sealed insulation cavity around the inner housing, the insulation cavity having a vacuum drawn therein; and

an intermediate housing positioned adjacent to the inner housing that includes metal phase change material comprising an alloy including Zinc (Zn), Magnesium (Mg), and Aluminum (Al), wherein the metal phase change material includes by weight about 35% to 55% Zn by weight, about 35-55% Mg by weight, about 2%-20% Al by weight, and about 0-15% Si by weight.

2. (canceled)

3. (canceled)

4. (previously presented) The device defined in claim 1, wherein the metal phase change material has a eutectic temperature in a range of about 339° to 350°.

5. (previously presented) The device defined in claim 4, wherein the metal phase change material has a eutectic temperature of about 340°.

6. (previously presented) The device defined in claim 8, wherein the metal phase change material has a eutectic temperature in a range of about 339° to 350°C.

7. (previously presented) The device defined in claim 6, wherein the metal phase change material has a eutectic temperature of about 340°C.

8. (currently amended) The device defined in claim 12, wherein the first phase change material comprises metal phase change material and the second phase change material comprises salt phase change material.

9. (currently amended) The device defined in claim 1, wherein the metal phase change material has ~~an~~ a thermal expansion upon undergoing a phase change ~~of less than about 8% volume increase~~ in the range of 5-8%.

10. (previously presented) The device defined in claim 1, wherein the exhaust treatment device includes a catalytic material.

11. (previously presented) The device defined in claim 12, wherein the inner housing of the exhaust treatment device is shaped and configured to form a particulate trap device.

12. (previously presented) A thermally-activated exhaust treatment device adapted to control exhaust emissions from an internal combustion compression engine, such as a diesel engine, comprising:

an inner housing having a first inlet and a first outlet defining a longitudinal direction and having an exhaust treatment device therein chosen to reduce emissions in exhaust of a diesel engine as the exhaust passes from the first inlet to the first outlet;

an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including a second inlet and a second outlet that align with the first inlet and the first outlet of the inner housing, the inner and outer housings including walls forming a sealed insulation cavity around the inner housing, the insulation cavity having a vacuum drawn therein; and

a thermal management system operably connected to the insulation cavity that is constructed to control heat flow from the inner housing to maximize the time the exhaust treatment device is within a predetermined optimum temperature operating range that includes a first phase change material that operates at an upper limit and a second phase change material that operates at a lower limit and that is in contact with but immiscible with the first phase change material so that the first and second phase change materials maintain distinct phase change characteristics from each other over a life of the treatment device.

13. (currently amended) The device defined in claim 12, wherein the predetermined optimum temperature operating range is between about 200°C for the lower limit and 400°C for the upper limit. ~~, and wherein the thermal management system is configured to change thermal properties of the insulation cavity in response to temperatures that are above and below the range of 200° to 400°C.~~

14. (previously presented) The device defined in claim 12, wherein the predetermined operating range is between about 250°C to 310°C at the lower and upper limits, respectively.

15. (previously presented) The device defined in claim 12, wherein the thermal management system comprises an active thermal control system.

16. (previously presented) The device defined in claim 15, wherein the active thermal control system includes an electrical circuit and an electrically heated metal hydride.

17. (previously presented) The device defined in claim 15, wherein the active thermal control system includes a coolant actively removing heat.

18. (previously presented) The device defined in claim 12, wherein the thermal management system comprises a passive thermal control system.

19. (previously presented) The device defined in claim 18, wherein the passive thermal control system includes passive air cooling fins attached to the outer housing.

20. (previously presented) The device defined in claim 18, wherein the passive thermal control system includes passively heated metal hydride.

21. (previously presented) The device defined in claim 12, wherein the exhaust treatment device includes a catalytic material.

22. (previously presented) The device defined in claim 12, wherein the exhaust treatment device includes a particulate trap device.

23. (previously presented) The device defined in claim 1, including a salt phase change material, the metal and salt phase change materials being in contact with each other, but being immiscible and thus separate even after use of the device.

24. (previously presented) A thermally-activated exhaust treatment device adapted to control exhaust emissions in a vehicle, comprising:

an inner housing having a first inlet and a first outlet defining a longitudinal direction and having an exhaust treatment device therein chosen to reduce emissions from exhaust of a combustion engine as the exhaust passes from the first inlet to the first outlet;

an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including a second inlet and a second outlet that align with the first inlet and the first outlet of the inner housing, the inner and outer housings including walls forming an insulation cavity around the inner housing; and

an intermediate housing positioned adjacent to the inner housing that includes metal phase change material comprising an alloy including Zinc (Zn), Magnesium (Mg), and Aluminum (Al), wherein the metal phase change material includes by weight about 35% to 55% Zn by weight, about 35-55% Mg by weight, about 2%-20% Al by weight, and about 0-15% Si by weight.

25. (previously presented) The device defined in claim 24, including a salt phase change material, the metal and salt phase change materials being in contact with each other, but being immiscible and thus separate even after use of the device.

26. (previously presented) A thermally-activated exhaust treatment device adapted to control exhaust emissions from an internal combustion compression engine, such as a diesel engine, comprising:

an inner housing having a first inlet and a first outlet defining a longitudinal direction and having an exhaust treatment device therein chosen to reduce emissions in exhaust of a diesel engine as the exhaust passes from the first inlet to the first outlet;

an outer housing enclosing the inner housing but characteristically not contacting the inner housing, the outer housing including a second inlet and a second outlet that align with the first inlet and the first outlet of the inner housing, the inner and outer housings including walls forming an insulation cavity around the inner housing; and

a thermal management system operably connected to the insulation cavity that is constructed to control heat flow from the inner housing to maximize the time the exhaust treatment device is within a predetermined optimum temperature operating range that includes a first phase change material that operates at an upper limit and a second phase change material that operates at a lower limit and that is in contact with but immiscible with the first phase change material so that the first and second phase change materials maintain distinct phase change characteristics from each other over a life of the treatment device.